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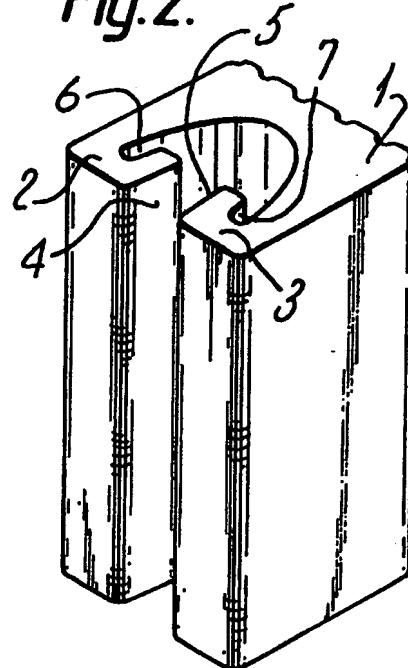
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(54) Fender made of resilient material

(57) A fender 1 made of resilient material and having a longitudinal opening 4, the fender being U-shaped

in cross-section, the ends of the arms of the U-shape extending inwardly to define supporting feet and there being inward projections on the supporting feet to define grooves 6, 7 to receive fixing means for the fender.

Fig. 2.



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Fig.1.

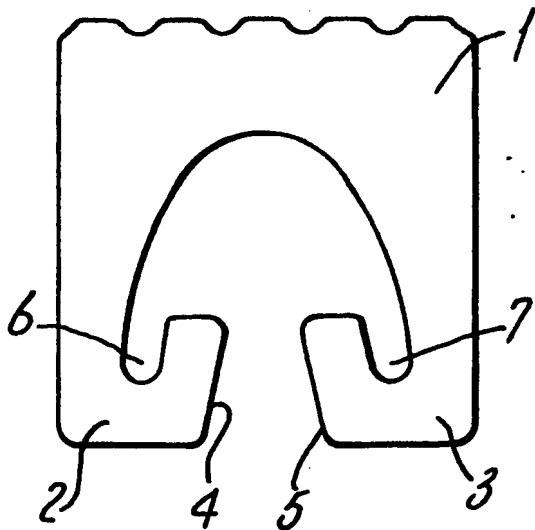


Fig.2.

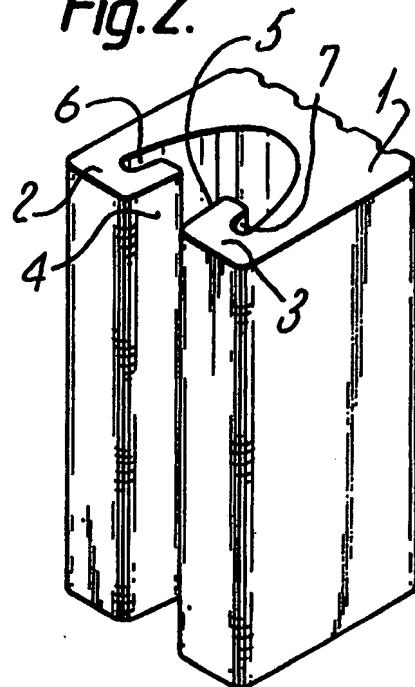


Fig.3.

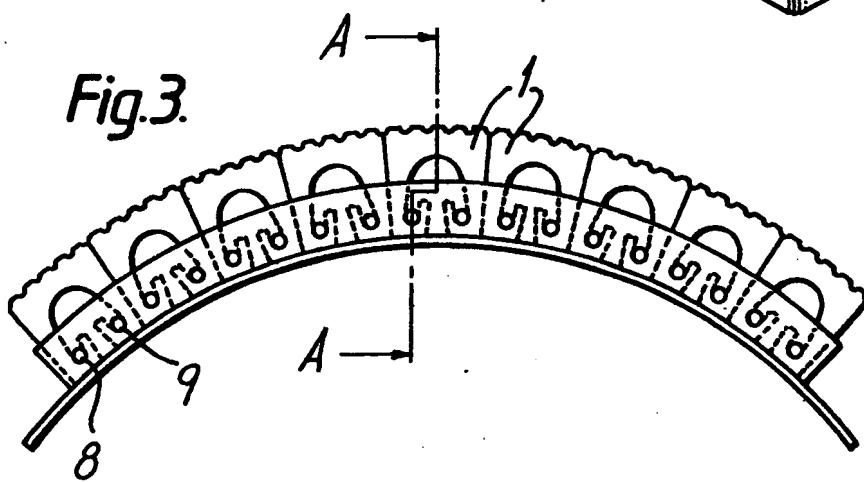
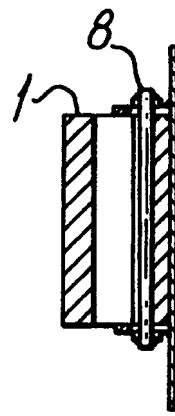


Fig.4.



**SPECIFICATION****Fender made of resilient material**

This invention relates to a fender made of a resilient material, with a longitudinal opening 5 containing fixing means.

Ships and harbour installations are extensively equipped with fenders of the abovementioned type. The fenders are intended to prevent damage which can occur when ships are docking and 10 manoeuvring. The larger the ship, the greater the demands on the fenders, these demands being in respect of load-bearing and the ability to withstand elastic deformations.

It is known to provide large-tonnage ships with 15 fenders which consist of individual rubber blocks and which are arranged next to one another or on top of one another in such a way that they cover the entire bow and stern areas of a ship. The size of the block fenders is such that they can only be produced individually in moulds, so that they do 20 not exceed tolerance limits which are set by fixing means for securing the blocks to the ships. Further, it is a disadvantage that the fixing means and thus the fenders can only be installed property 25 at great expense.

The aim of the invention is to provide fenders which are easier to make and to secure in position. According to the present invention there is provided a fender made of resilient material and 30 having a longitudinal opening, the fender being U-shaped in cross-section, the ends of the arms of the U-shape extending inwardly to define supporting feet and there being inward projections on the supporting feet to define grooves to receive 35 fixing means for the fender. The intended fixing means are bars received in the grooves and these can be fully effective even when only low tolerance demands are made and observed in manufacture of the fenders.

40 Fenders of the invention can be produced by the spraying process, so that expensive production in moulds can be dispensed with. Furthermore, the fenders can be cut so as to have matching ends, as required, so that an improved suitability for the 45 conditions and fitting to the available space is also possible, and makes the fenders more widely useful. At the same time, particular designs of the supporting feet can lead to the fixing being easier because the fenders are in effect hung on the 50 fixing means. The fixing means, namely the bars, are pulled into the grooves and simultaneously held in position by the inwardly projecting ribs. Preferably the width of the grooves should match that of the fixing means. This leads to precise 55 fixing of the fenders which is necessary when these are to be arranged in groups next to and behind one another. The ribs have a thickness and height appropriate to the expected stress to be 60 withstood. For full effectiveness, it should be ensured that sufficient elastic deformation is possible in the zone between the fixing means, without the ribs thereby being able to bend too far

to the side. In determining the groove width, expected rib pressure and rib height, it is

65 advantageous to start from the assumption of a Shore hardness of about 65. It is advantageous to use a type of rubber which is sufficiently resistant to the stresses occurring in sea water. A suitable resilient material is polybutadiene/styrene of

70 Shore A hardness 70.

The surface of the fender is preferably undulated in the direction of the ribs. This avoids a large surface pressure and thus guarantees a better operational efficiency.

75 The invention will be more clearly understood from the following description which is given by way of example only with reference to the accompanying drawings in which:

Figure 1 is a cross-section and Figure 2 shows 80 a perspective view of a fender according to the invention and Figures 3 and 4 show from the side and in section a way of fixing fenders of the invention.

As shown in Figure 1, the fender 1 has a wall 85 thickness of about 100 mm in the central zone of the front face. The fender is U-shaped in cross-section and opens downwards, having inturned feet 2 and 3 to rest on the side of a ship and having inwardly extending ribs 4, 5. Behind the

90 ribs are grooves 6, 7 in which round bars 8 and 9 are to be arranged, as can be seen in Figure 3. By means of these round bars, which extend for instance around the bow of the ship, the ship's fender can be held firmly in position. It is also possible to provide groups of fenders

95 simultaneously, as can be seen from Figure 3. The width of the feet 2 and 3 is about 100 mm in each case. The ribs 4 and 5 are approximately the same height. The distance between the ribs is equal to about half the width of the feet. The distance is sufficient if the round bars 8 and 9 can be passed through the grooves 6, 7 without difficulty. Figure 2 also shows that the fender is provided with ribs on the surface.

**100 CLAIMS**

1. A fender made of resilient material and having a longitudinal opening, the fender being U-shaped in cross-section, the ends of the arms of the U-shape extending inwardly to define

110 supporting feet and there being inward projections on the supporting feet to define grooves to receive fixing means for the fender.

2. A fender according to Claim 1, and including fixing means in the form of bars to be received in the grooves, the width of the grooves matching the width of the bars.

3. A fender according to Claim 1 or 2, wherein the surface of the fender remote from the opening has longitudinal recesses and projections so as to be undulating.

4. A fender according to any preceding claim made of polybutadiene/styrene of Shore A hardness 70.

5. A fender substantially as hereinbefore

described with reference to and as illustrated in  
the accompanying drawings.

6. A system of fenders including a plurality of

fenders according to any preceding claim arranged  
5 in alignment and secured by bars received in the  
grooves of each of them.